CLAIMS

What is claimed is:

1. A method for characterizing piezoelectric sensor signal responses for automotive vehicle crash analysis, said method comprising:

providing at least one piezoelectric sensor mounted at a predetermined location on the automotive vehicle;

sampling a response from the piezoelectric sensor for a predetermined period of time;

subjecting the response from the piezoelectric sensor to a wavelet analysis and obtaining signal amplitudes;

plotting the signal amplitudes in three-dimensional space and forming a cluster of signal amplitudes;

comparing a most recent cluster to reference clusters that are indicative of both crash and non-crash events; and

providing appropriate instructions to an occupant restraint control system in the automotive vehicle.

2. The method of claim 1, further comprising providing three polyvinylidene fluoride piezoelectric sensors mounted at predetermined locations on a transparency product of the automotive vehicle.

3. The method of claim 2, wherein the transparency product is a windshield.

4. The method of claim 3, comprising applying a Daubechies transfer function in the wavelet analysis.

5. A method for characterizing piezoelectric sensor signal responses for automobile crash analysis, said method comprising:

providing at least three polyvinylidene fluoride piezoelectric sensors;

mounting the three polyvinylidene fluoride piezoelectric sensors on a windshield of the automobile;

sampling responses from the three polyvinylidene fluoride piezoelectric sensors for a predetermined period of time;

subjecting the responses from the three polyvinylidene fluoride piezoelectric sensors to a Daubechies wavelet analysis and obtaining Daubechies amplitudes for each polyvinylidene fluoride piezoelectric sensor;

aggregating the Daubechies amplitudes from the three polyvinylidene fluoride piezoelectric sensors and plotting the intersection of the Daubechies amplitudes and forming a cluster of the Daubechies amplitudes;

comparing a plurality of most recent clusters to a library of reference clusters in a memory storage area of the automobile; and

instructing an occupant restraint control system in the automobile to deploy specific airbags.

6. The method of claim 5, comprising providing a fourth polyvinylidene fluoride piezoelectric sensor.

7. The method of claim 5, comprising incorporating the fourth polyvinylidene fluoride piezoelectric sensor into a rear-view mirror mounting button of the automobile.

8. The method of claim 5, further comprising using orthogonal single-axis polyvinylidene fluoride piezoelectric sensors.

9. The method of claim 5, further comprising using a dual signal path integrated circuit for sampling responses from the polyvinylidene fluoride piezoelectric sensors.

10. The method of claim 5, wherein at least one application-specific integrated circuit controls the method.

11. The method of claim 10, further comprising locating the at least one application-specific integrated circuit in at least one piezoelectric sensor.

12. The method of claim 10, further comprising locating the at least one application-specific integrated circuit within the occupant restraint control system.

13. A system for controlling deployment of airbags in an automotive vehicle, comprising:

three polyvinylidene fluoride piezoelectric sensors;

a means for sampling responses from the piezoelectric sensors for a predetermined period of time;

a means for applying wavelet analysis to the responses to obtain signal amplitudes;

a means for combining the signal amplitudes and plotting a commonality point of the signal amplitudes in three-dimensional space;

a means for comparing most recent signal amplitudes to a library including a memory of reference signal amplitudes; and

a means for instructing deployment of the airbags using results from comparing the most recent signal amplitudes to the reference signal amplitudes.

14. A method for characterizing a response from a sensor used for automotive vehicle crash analysis, said method comprising:

providing at least one sensor mounted at a predetermined location on the automotive vehicle;

sampling a response from the sensor for a predetermined period of time;

subjecting the response from the sensor to a wavelet analysis and obtaining signal amplitudes;

plotting the signal amplitudes in three-dimensional space and forming a cluster of signal amplitudes;

comparing a most recent cluster to reference clusters that are indicative of both crash and non-crash events; and

providing appropriate instructions to an occupant restraint control system in the automotive vehicle.

15. The method of claim 14, wherein the sensor is a piezoelectric sensor.